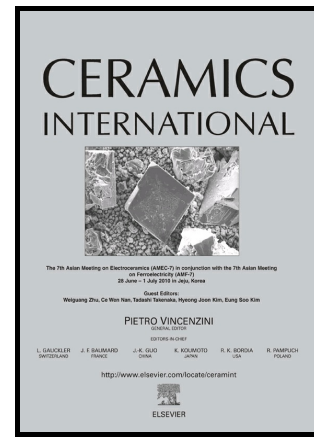


# Author's Accepted Manuscript

Fracture Mechanics analysis of buckling of a ceramic foam coating from elastic substrates

Y.J. Cui, B.L. Wang, K.F. Wang, J.E. Li



www.elsevier.com/locate/ceri

PII: S0272-8842(18)31719-X  
DOI: <https://doi.org/10.1016/j.ceramint.2018.06.276>  
Reference: CERII8720

To appear in: *Ceramics International*

Received date: 4 June 2018  
Revised date: 29 June 2018  
Accepted date: 30 June 2018

Cite this article as: Y.J. Cui, B.L. Wang, K.F. Wang and J.E. Li, Fracture Mechanics analysis of buckling of a ceramic foam coating from elastic substrates, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.06.276>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Fracture Mechanics analysis of buckling of a ceramic foam coating from elastic substrates

Y.J. Cui<sup>1</sup>, B.L. Wang<sup>1,2,\*</sup>, K.F. Wang<sup>1</sup>, J.E. Li<sup>3</sup>,

<sup>1</sup> Graduate School at Shenzhen, Harbin Institute of Technology, Harbin 150001, PR China

<sup>2</sup> Centre for Infrastructure Engineering, School of Computing, Engineering and Mathematics, Western Sydney University, Penrith, NSW 2751, Australia

<sup>3</sup> Architectural Engineering Institute, Jinling Institute of Technology, Nanjing 211169, P.R. China

**Abstract:** Ceramic foams are ideal materials for thermal protection systems such as those used as a thermal shield on the space shuttle. The working temperature difference between the outer and inner surfaces of the ceramic foam is extremely high. Under this adverse condition, the ceramic foam coating could buckle from its underneath structures. Therefore, the general problem of damage due to buckling delamination of a ceramic coating on an elastic substrate is investigated in this paper. The delamination buckling amplitude and the stress intensity factor at the tip of buckling region are derived in closed form in terms of the porosity of the ceramic foam. Based on the maximum amplitude and the critical stress intensity factor criteria, critical temperatures of coating buckling from the substrate are established. A fitting formula of maximum buckling amplitude as a function of outer surface temperature is given. It is found that higher porosity and length-to-thickness ratio of the coating will result in a smaller stress intensity factor. However, it seems that the buckling amplitude is independent of the porosity of ceramic foams.

**Keywords:** ceramic foam; thermal shield; buckling; stress intensity factor; amplitude

---

\* Corresponding author email: wangbl2001@hotmail.com

Download English Version:

<https://daneshyari.com/en/article/8948475>

Download Persian Version:

<https://daneshyari.com/article/8948475>

[Daneshyari.com](https://daneshyari.com)